CLAIMS

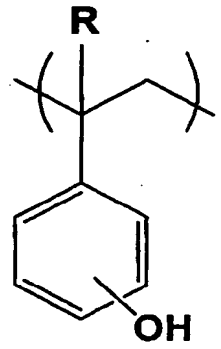
1. A positive resist composition for a low-acceleration electron beam, comprising a resin component (A), which contains acid dissociable, dissolution inhibiting groups and exhibits increased alkali solubility under action of acid, and an acid generator component (B) that generates acid on exposure, wherein

a residual film ratio following alkali developing in unexposed portions of a resist film formed from said positive resist composition for a low-acceleration electron beam is 80% or higher.

2. A positive resist composition for a low-acceleration electron beam, comprising a resin component (A'), which contains alkali-soluble structural units (a1) and structural units (a2) that contain an acid dissociable, dissolution inhibiting group, and exhibits increased alkali solubility under action of acid, and an acid generator component (B) that generates acid on exposure, wherein

at least one of said structural units (a1) and (a2) within said resin component (A') contains a polycyclic group.

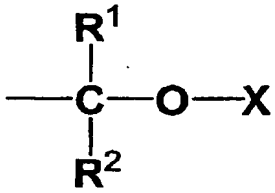
3. A positive resist composition for a low-acceleration electron beam according to claim 2, wherein said structural units (a1) comprise structural units (a1 1) represented by a general formula (I) shown below:



(I)

[wherein, R represents a hydrogen atom or a methyl group].

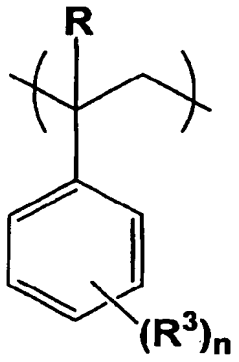
4. A positive resist composition for a low-acceleration electron beam according to claim 3, wherein said resin component (A') is a polymer (A'1) containing said structural units (a11), and structural units (a21), in which hydrogen atoms of a portion of hydroxyl groups of said structural units (a11) are protected with acid dissociable, dissolution inhibiting groups represented by a general formula (II) shown below:



(II)

[wherein, R^1 represents an alkyl group of 1 to 5 carbon atoms, R^2 represents an alkyl group of 1 to 5 carbon atoms or a hydrogen atom, and X represents an aliphatic polycyclic group or an aromatic polycyclic hydrocarbon group].

5. A positive resist composition for a low-acceleration electron beam according to claim 4, wherein said polymer (A'1) further comprises structural units (a3) represented by a general formula (III) shown below:



(III)

[wherein, R represents a hydrogen atom or a methyl group, R^3 represents an alkyl group of 1 to 5 carbon atoms, and n represents either 0 or an integer of 1 to 3].

6. A positive resist composition for a low-acceleration electron beam according to claim 4, wherein R within said general formula (I) is a hydrogen atom.

7. A positive resist composition for a low-acceleration electron beam according to claim 4, wherein a weight average molecular weight of said polymer (A'1), prior to protection with said acid dissociable, dissolution inhibiting groups, is within a range from 2,000 to 30,000.

8. A positive resist composition for a low-acceleration electron beam according to claim 4, wherein a proportion of said structural units (a21) within said polymer (A'1) is within a range from 5 to 35 mol%.

9. A positive resist composition for a low-acceleration electron beam according to claim 3, wherein said resin component (A') is a copolymer (A'2) comprising said structural units (a11), and structural units (a12) derived from a (meth)acrylic acid containing an aliphatic polycyclic group with an alcoholic hydroxyl group, and a portion of hydroxyl

groups of said structural units (a11) and alcoholic hydroxyl groups of said structural units (a12) are protected with acid dissociable, dissolution inhibiting groups.

10. A positive resist composition for a low-acceleration electron beam according to claim 9, wherein a weight average molecular weight of said copolymer (A'2), prior to protection with said acid dissociable, dissolution inhibiting groups, is at least 2,000 but no more than 8,500.

11. A positive resist composition for a low-acceleration electron beam according to claim 9, wherein from 10 to 35 mol% of a combined total of hydroxyl groups of said structural units (a11) and alcoholic hydroxyl groups of said structural units (a12) within said copolymer (A'2) are protected with said acid dissociable, dissolution inhibiting groups.

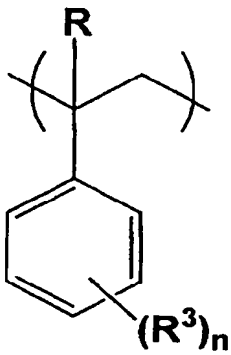
12. A positive resist composition for a low-acceleration electron beam according to claim 9, wherein a molar ratio between said structural units (a11) and said structural units (a12) within said copolymer (A'2) prior to protection with said acid dissociable, dissolution inhibiting groups is within a range from 95:5 to 75:25.

13. A positive resist composition for a low-acceleration electron beam according to claim 9, wherein said structural units (a12) are derived from a (meth)acrylate ester containing an adamantyl group with an alcoholic hydroxyl group.

14. A positive resist composition for a low-acceleration electron beam according to claim 9, wherein said structural units (a12) comprise only structural units derived from an acrylate ester containing an aliphatic polycyclic group with an alcoholic hydroxyl group.

15. A positive resist composition for a low-acceleration electron beam according to claim 9, wherein said acid dissociable, dissolution inhibiting groups are 1-lower alkoxyalkyl groups.

16. A positive resist composition for a low-acceleration electron beam according to claim 9, wherein said copolymer (A'2) further comprises structural units (a3) represented by a general formula (III) shown below:



(III)

[wherein, R represents a hydrogen atom or a methyl group, R^3 represents an alkyl group of 1 to 5 carbon atoms, and n represents either 0 or an integer of 1 to 3].

17. A positive resist composition for a low-acceleration electron beam according to claim 4, wherein a dispersity of said polymer (A'1) prior to protection with said acid dissociable, dissolution inhibiting groups is no higher than 2.0.

18. A positive resist composition for a low-acceleration electron beam according to claim 9, wherein a dispersity of said copolymer (A'2) prior to protection with said acid dissociable, dissolution inhibiting groups is no higher than 2.0.

19. A positive resist composition for a low-acceleration electron beam according to either one of claim 1 and claim 2, further comprising a nitrogen-containing organic compound (D), wherein said component (D) comprises a secondary or tertiary aliphatic amine containing an alkyl group of 7 to 15 carbon atoms.

20. A positive resist composition for a low-acceleration electron beam according to either one of claim 1 and claim 2, which is used for a multi-layer resist laminate.

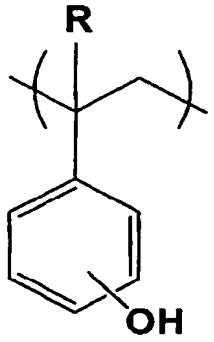
21. A resist laminate comprising a lower organic film layer that can be dry etched, an interlayer, and an upper resist film layer laminated sequentially on top of a substrate, wherein

said upper resist film layer is formed from a positive resist composition for a low-acceleration electron beam that comprises a resin component (A), which contains acid dissociable, dissolution inhibiting groups and exhibits increased alkali solubility under action of acid, and an acid generator component (B) that generates acid on exposure, and a residual film ratio for said upper resist film layer is 80% or higher.

22. A resist laminate comprising a lower organic film layer that can be dry etched, an interlayer, and an upper resist film layer laminated sequentially on top of a substrate, wherein

said upper resist film layer is formed from a positive resist composition for a low-acceleration electron beam that comprises a resin component (A'), which contains alkali-soluble structural units (a1) and structural units (a2) that contain an acid dissociable, dissolution inhibiting group, and exhibits increased alkali solubility under action of acid, and an acid generator component (B) that generates acid on exposure, and at least one of said structural units (a1) and (a2) within said resin component (A') contains a polycyclic group.

23. A resist laminate according to claim 22, wherein in said positive resist composition for a low-acceleration electron beam, said structural units (a1) within said resin component (A') comprise structural units (a11) represented by a general formula (I) shown below:

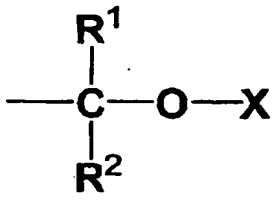


(I)

[wherein, R represents a hydrogen atom or a methyl group].

24. A resist laminate according to claim 23, wherein in said positive resist composition for a low-acceleration electron beam, said resin component (A') is a polymer (A'1) containing said structural units (a11), and structural units (a21), in which hydrogen atoms of a portion of hydroxyl groups of said structural units (a11) are protected with acid

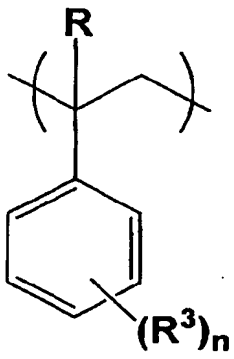
dissociable, dissolution inhibiting groups represented by a general formula (II) shown below:



(II)

[wherein, R^1 represents an alkyl group of 1 to 5 carbon atoms, R^2 represents an alkyl group of 1 to 5 carbon atoms or a hydrogen atom, and X represents an aliphatic polycyclic group or an aromatic polycyclic hydrocarbon group].

25. A resist laminate according to claim 24, wherein said polymer (A'1) further comprises structural units (a3) represented by a general formula (III) shown below:



(III)

[wherein, R represents a hydrogen atom or a methyl group, R^3 represents an alkyl group of 1 to 5 carbon atoms, and n represents either 0 or an integer of 1 to 3].

26. A resist laminate according to claim 24, wherein R within said general formula (I) is a hydrogen atom.

27. A resist laminate according to claim 24, wherein a weight average molecular weight of said polymer (A'1), prior to protection with said acid dissociable, dissolution inhibiting groups, is within a range from 2,000 to 30,000.

28. A resist laminate according to claim 24, wherein a proportion of said structural units (a21) within said polymer (A'1) is within a range from 5 to 35 mol%.

29. A resist laminate according to claim 23, wherein said resin component (A') is a copolymer (A'2) comprising said structural units (a11), and structural units (a12) derived from a (meth)acrylic acid containing an aliphatic polycyclic group with an alcoholic hydroxyl group, and a portion of hydroxyl groups of said structural units (a11) and alcoholic hydroxyl groups of said structural units (a12) are protected with acid dissociable, dissolution inhibiting groups.

30. A resist laminate according to claim 29, wherein a weight average molecular weight of said copolymer (A'2), prior to protection with said acid dissociable, dissolution inhibiting groups, is at least 2,000 but no more than 8,500.

31. A resist laminate according to claim 29, wherein from 10 to 35 mol% of a combined total of hydroxyl groups of said structural units (a11) and alcoholic hydroxyl groups of said structural units (a12) within said copolymer (A'2) are protected with said acid dissociable, dissolution inhibiting groups.

32. A resist laminate according to claim 29, wherein a molar ratio between said structural units (a11) and said structural units (a12) within said copolymer (A'2) prior to

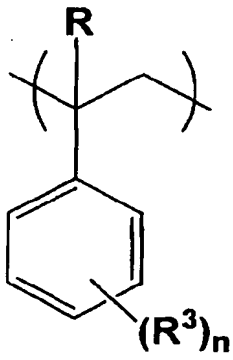
protection with said acid dissociable, dissolution inhibiting groups is within a range from 95:5 to 75:25.

33. A resist laminate according to claim 29, wherein said structural units (a12) are derived from a (meth)acrylate ester containing an adamantyl group with an alcoholic hydroxyl group.

34. A resist laminate according to claim 29, wherein said structural units (a12) comprise only structural units derived from an acrylate ester containing an aliphatic polycyclic group with an alcoholic hydroxyl group.

35. A resist laminate according to claim 29, wherein said acid dissociable, dissolution inhibiting groups are 1-lower alkoxyalkyl groups.

36. A resist laminate according to claim 29, wherein said copolymer (A'2) further comprises structural units (a3) represented by a general formula (III) shown below:



(III)

[wherein, R represents a hydrogen atom or a methyl group, R^3 represents an alkyl group of 1 to 5 carbon atoms, and n represents either 0 or an integer of 1 to 3].

37. A resist laminate according to claim 24, wherein a dispersity of said polymer (A'1) prior to protection with said acid dissociable, dissolution inhibiting groups is no higher than 2.0.

38. A resist laminate according to claim 29, wherein a dispersity of said copolymer (A'2) prior to protection with said acid dissociable, dissolution inhibiting groups is no higher than 2.0.

39. A resist laminate according to either one of claim 21 and claim 22, wherein said positive resist composition for a low-acceleration electron beam further comprises a nitrogen-containing organic compound (D), and said component (D) comprises a secondary or tertiary aliphatic amine containing an alkyl group of 7 to 15 carbon atoms.

40. A method of pattern formation, comprising sequentially conducting a laminate formation step of forming a resist laminate according to either one of claim 21 and claim 22, a step of conducting exposure of said upper resist film layer of said resist laminate using a low-acceleration electron beam, and then conducting alkali developing to form a resist pattern in said upper resist film layer, a step of conducting oxide etching using said resist pattern as a mask pattern, thereby transferring a pattern to said interlayer, and a step of conducting dry etching of said lower organic film layer using said resist pattern and said pattern within said interlayer as a mask pattern, thereby forming a lower layer pattern within said lower organic film layer.

41. A method of pattern formation according to claim 40, wherein said exposure using said low-acceleration electron beam is conducted through a mask pattern.

42. A method of pattern formation according to claim 41, wherein said oxide etching is conducted using a halogen-based gas.

43. A method of pattern formation according to claim 41, wherein said dry etching is etching that uses an oxygen plasma.